CLAIMS:

1. A method of identifying a microorganism comprising the steps of:
   a) obtaining a test sample of an unknown microorganism;
   b) adding a mediator or mediator mixture to the test sample in the presence of an effector;
   c) assessing variation in respiration rate of the microorganism over a pre-determined time period; and
   d) comparing the variation in the respiration rate of the microorganism with the variation in respiration rates of known microorganisms exposed to the effector, thereby identifying the unknown microorganism in the test sample.

2. The method of claim 1 wherein the step of adding a mediator or mediator mixture to the test sample comprises combining the test sample with a solution of the effector for a fixed time prior to adding the mediator.

3. The method of claim 2 wherein the mediator or mediator mixture comprises an oxidant.

4. The method of claim 3 wherein the mediator or mediator mixture is ferricyanide, dichlorophenol-indophenol (DCIP), ferrocene and ferrocene derivatives, methylene blue, janus green, tris(bipyridyl)iron(III), a quinone, or a phenazine.

5. The method of claim 4 wherein the quinone is benzoquinone, naphthoquinone, menadione, anthraquinone, or substituted derivatives of these.

6. The method of claim 4 wherein the phenazine is phenazine methosulfate or phenazine ethosulfate.

7. The method of claim 1 wherein the respiration rates of the unknown microorganism and known microorganism are assessed using electrochemical measurements.

8. The method of claim 7 wherein the electrochemical measurements are biamperometric or coulometric.

9. The method of claim 7 wherein the respiration rate of the unknown microorganism and the known microorganism are assessed by the electrochemical measurement of mediator consumption.

10. The method of claim 1 wherein the pre-determined time period is up to 15 minutes.

11. The method of claim 1 wherein the unknown microorganism is in an arrested growth state.

12. The method of claim 1 wherein a plurality of effectors are separately employed to assess variations in respiration rate.

13. The method of claim 12 wherein said effector is selected from the group consisting of succinate, D-xylose, D-lactose, ornithine, alpha-ketoglutarate, beta-glycerophosphate, D-fructose, sucrose, L-lysine, lactic acid, L-arginine, D-sorbitol, formic acid, L-tryptophan, D-galactose, L-rhamnose, D-arabinose, pyruvic acid, citric acid, malonic acid, D-mannose, beta-cyclodextrin, nitrate and glucose.

14. A method of differentiating Gram-positive and Gram-negative bacteria comprising the steps of:

a) obtaining a test sample of a bacterium;

b) adding a mediator mixture containing a lipid-soluble redox mediator to the test sample;

c) assessing variations of respiration rate of the bacterium over a pre-determined time period; and

d) comparing the respiration rate of the bacterium with the respiration rate of another sample of the same bacterium not exposed to the lipid-soluble redox mediator, wherein a significant change in respiration rate indicates

the presence of a Gram-positive bacterium and no significant change in respiration rate indicates the presence of a Gram-negative bacterium.

15. The method of claim 14 wherein the lipid-soluble redox mediator comprises an oxidant.

16. The method of claim 15 wherein the mediator or mediator mixture is ferricyanide, dichlorophenol-indophenol (DCIP), ferrocene and ferrocene derivatives, methylene blue, janus green, tris(bipyridyl)iron(III), a quinine, or a phenazine.

17. The method of claim 16 wherein the quinone is benzoquinone, naphthoquinone, menadione, anthraquinone, or substituted derivatives of these.

18. The method of claim 16 wherein the phenazine is phenazine methosulfate or phenazine ethosulfate.

19. A method of differentiating individual strains of microorganisms in a plurality of strains of microorganisms, which method comprises the steps of:

a) culturing a plurality of samples of each individual strain of microorganism in the presence of a plurality of effector compounds, each sample being cultured separately with one of the plurality of effector compounds in the presence of a mediator compound;

b) assessing variation in respiration rate of each microorganism in the presence of each effector compound over a pre-determined time period; and

c) transforming data measurements of the variation in respiration rate for each sample of each individual strain of microorganism cultured with an effector compound in the presence of a mediator compound to accentuate differentiating characteristics among said individual strains of microorganisms.

20. The method of claim 19 further comprising ranking individual effector compound efficacy according to the contribution of each individual effector compound to variations in respiration rate among said individual strains of microorganisms.

21. A method of differentiating individual strains of microorganisms in a plurality of strains of microorganisms, which method comprises the steps of:

a) culturing a plurality of samples of each individual strain of microorganism in the presence of a plurality of mediator compounds, each sample being cultured separately with one of the plurality of mediator compounds in the presence of an effector compound;

b) assessing variation in respiration rate of each microorganism in the presence of each mediator compound over a pre-determined time period; and

c) transforming data measurements of the variation in respiration rate for each sample of each individual strain of microorganism cultured with a mediator compound in the presence of an effector compound to accentuate differentiating characteristics among said individual strains of microorganisms.

22. The method of claim 21 further comprising ranking individual mediator compound efficacy according to the contribution of each individual mediator compound to variations in respiration rate among said individual strains of microorganisms.